

**U.S. FISH AND WILDLIFE SERVICE  
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: Margaritifera marrianae Johnson 1983

COMMON NAME: Alabama pearlshell

LEAD REGION: 4

INFORMATION CURRENT AS OF: October, 2005

STATUS/ACTION:

☐ Species assessment - determined species did not meet the definition of endangered or

threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☐ 12-month warranted but precluded - FR date:

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov/>).

☐ Listing priority change

Former LP:

New LP: \_\_\_\_

Date when the species first became a Candidate (as currently defined): October 25, 1999

\_\_\_\_ Candidate removal: Former LP: \_\_\_\_

\_\_\_\_ A - Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

\_\_\_\_ U - Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

\_\_\_\_ F - Range is no longer a U.S. territory.

\_\_\_\_ I - Insufficient information exists on biological vulnerability and threats to support listing.

\_\_\_\_ M - Taxon mistakenly included in past notice of review.

\_\_\_\_ N - Taxon may not meet the Act's definition of "species."

\_\_\_\_ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Clams and Mussels - Unionidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: AL

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE:  
AL

LAND OWNERSHIP: All streams and riparian areas where the Alabama pearlshell survives are privately owned.

LEAD REGION CONTACT: Rick Gooch, 404/679-7124, richard\_gooch@fws.gov

LEAD FIELD OFFICE CONTACT: Jackson, Mississippi Field Office, Paul Hartfield, 601/321-1125, paul\_hartfield@fws.gov

BIOLOGICAL INFORMATION:

Species Description

The Alabama pearlshell is a medium-sized mussel, up to 95 millimeters (mm) (3.8 inches (in)) in length, and oblong in outline. The shell exterior is colored a dark olivaceous or blackish-brown and is marked by small irregular ridges on the posterior slope of the shell. The nacre is bluish-white and moderately iridescent (see Johnson 1983 for a more detailed description).

## Taxonomy

The Alabama pearlshell, (*Margaritifera marrianae* Johnson 1983), is a fresh water mussel in the family Margaritiferidae. Known only from certain tributaries of the Alabama and Escambia River drainages of south-central Alabama, the Alabama pearlshell was described as a distinct species by Johnson (1983). It had previously been included with the Louisiana pearlshell, *Margaritifera hembeli* (Conrad 1838), a species now considered endemic to central Louisiana.

## Habitat

The Alabama pearlshell is found in shallow riffles and along pool margins of small creeks and streams. The host fish and other aspects of its life history are unknown.

## Historical Range/Distribution

The historic and present distribution of the Alabama pearlshell is confined to south-central Alabama (Ortmann 1912, Simpson 1914, Clench and Turner 1956, Stansbery 1976, National Biological Survey (NBS) in litt. 1994; Shelton 1995, 1996, in litt. 1998). In the Escambia River drainage, the species has been reported from tributaries of the Conecuh River, including Sandy Creek; Murder Creek and its tributaries Jordan, Autrey, Gin, Hunter, Otter, Beaver Creeks, and Little Cedar Creek, in Conecuh County; Bottle Creek, Conecuh County; Burnt Corn Creek, Conecuh/Monroe Counties; and Horse Creek, Crenshaw County. The species has also been reported from three streams in the Alabama River drainage: Limestone Creek and its tributary Brushy Creek, and Big Flat Creek, Monroe County, Alabama.

## Current Range/Distribution

Knowledge of the current status and distribution of the Alabama pearlshell is based on recent surveys of more than 80 historic and potential localities of the Alabama pearlshell in the Brushy, Burnt Corn, and Patsaliga Creek drainages, and the Conecuh and Sepulga River drainages in Monroe, Conecuh, Crenshaw, Escambia, Covington, and Butler Counties, Alabama. These surveys were conducted between 1991 and 2005 by biologists from the National Fisheries Research Center (Gainesville, Florida), Troy University (Troy, Alabama), Douglas Shelton (Alabama Malacological Research Center, Mobile, Alabama), and Service biologists (Jackson Field Office, Mississippi, Daphne Field Office, Alabama). More than 50 tributaries of the Alabama River have also been surveyed for mollusks (Malcolm Pierson, Calera, Alabama, in litt. 1993; McGregor et al. 1996).

Only three extant populations of Alabama pearlshells have been confirmed by survey efforts during the past 15 years: Hunter, Jordan, and Little Cedar Creeks, Murder Creek drainage, Conecuh County, Alabama (NBS field records in litt. 1991, 1993; Service field records in litt. 1991-2005, Shelton in litt. 1998, Pilarczyk in litt. 2005, Powell in litt. 2005).

### Population Estimates/Status

Jordan Creek supports the highest numbers of Alabama pearlshell (63 individuals reported in 1998), and the presence of a few juvenile/subadult individuals indicates some level of recruitment in this population. Little Cedar Creek also contains good numbers of Alabama pearlshells (54 individuals reported in 1998) and shows the greatest variety of age classes of the three populations. Both Jordan and Little Cedar Creeks continued to sustain good populations with considerable evidence of recent recruitment in 1999 (Shelton in litt. 1999). Live pearlshell continue to be found in Jordan and Little Cedar Creeks (Pilarczyk in litt. 2005, Powell in litt. 2005), although there has been no population assessment since 1999.

Live Alabama pearlshell have not been observed in Hunter Creek since 1998, when 8 live individuals were reported (Shelton in litt. 1998). During two visits to the stream in 1999, Shelton found no evidence of the species (Shelton in litt. 1999), and reported high levels of sedimentation in Hunter Creek. In 2005 the shells of three fresh dead Alabama pearlshells were recovered from Hunter Creek, however, channel degradation and instability, and sedimentation continued to impact the channel (Powell in litt. 2005).

Evidence suggests that much of the decline of this species has occurred within the past few decades. The Alabama pearlshell was relatively common in localized portions of Limestone Creek and its tributary Brushy Creek, Alabama River drainage, as recently as 1974 (Williams, National Biological Survey (NBS), pers. comm. 1993). Searches of this creek drainage in recent years have located only a few shell fragments (NBS in litt. 1994). Twelve specimens of the Alabama pearlshell were collected from Horse Creek, Conecuh River drainage, Crenshaw County, as recently as 1981 (University of Massachusetts collection record). Repeated searches of this stream drainage have failed to locate even shell fragments, and the species appears to be extirpated from this portion of its range. Records of occurrence exist for Autrey Creek from 1964 (Museum of Fluvatile Mollusks collection record). The most recent records from other historically occupied sites in Murder Creek proper, three of its tributaries, and Burnt Corn Creek, date from the early 1900's. The species has apparently been extirpated from these localities.

The most recent surveys indicate that the distribution of the Alabama pearlshell continues to decline. The species was last reported in 1995 from Sandy Creek, Conecuh County, and Big Flat Creek, Monroe County, however, 1998 surveys failed to relocate Alabama pearlshells at these sites (Shelton in litt. 1998).

Specific causes of the decline and disappearance of the Alabama pearlshell from historical stream localities are unknown. However, they are probably related to past and present land use patterns. Many of the small streams historically inhabited by the Alabama pearlshell are impacted to various degrees by nonpoint source pollution.

## THREATS:

### A. The present or threatened destruction, modification, or curtailment of its habitat or range.

The Alabama pearlshell has disappeared from most of its historic range, including 13 stream systems in south Alabama. The species is now known to inhabit two small stream systems in Conecuh County, Alabama. The small stream habitats of the Alabama pearlshell are vulnerable to habitat modification, sedimentation, and water quality degradation from a number of activities associated with modern civilization. Highway construction, improper logging practices, agriculture, housing developments, pipeline crossings, or cattle grazing often result in physical disturbance of stream substrates or the riparian zone, and/or changes in water quality, temperature, or flow.

Sedimentation can cause direct mortality of freshwater mussels by deposition and suffocation (Ellis 1936, Box and Mossa 1999) and can eliminate or reduce the recruitment of juvenile mussels (Negus 1966, Box and Mossa 1999). Suspended sediment can also interfere with feeding activity (Dennis 1984). Many of the streams recently surveyed for the Alabama pearlshell were characterized by high sediment loads (NBS and Service field observations, 1991-1994). Heavy sand bedloads in some of the streams have apparently rendered them unsuitable for any mussel species. Current sources of sand and other sediment accumulation in south-central Alabama stream channels include cultivated fields, silviculture practices, cattle grazing, and unpaved road drainage. Certain silvicultural and agricultural activities cause erosion, riparian buffer degradation, and increased sedimentation of stream habitats. Strict adherence to Forestry Best Management Practices and maintaining buffers between cultivated fields and riparian areas minimizes these impacts. Uncontrolled access to small streams by cattle may result in destruction of riparian vegetation, bank degradation and erosion, and localized sedimentation of stream habitats. Alabama pearlshell habitat in Hunter Creek exhibited evidence of recent sedimentation during surveys in 1999 (Shelton in litt. 1999), presumably from construction of an upstream nature trail.

Several streams surveyed for the presence of the Alabama pearlshell showed signs of eutrophication, such as heavy growth of blue-green and other algae (NBS in litt. 1994, Service field observations 1994). Nutrients, usually phosphorus and nitrogen, may emanate from agricultural fields, residential lawns, livestock feedlots, poultry houses, and leaking septic tanks in levels that result in eutrophication and reduced oxygen levels in small streams.

Pesticide residues from agricultural, residential, or silvicultural activities may also impact Alabama pearlshell populations. There is no information on the sensitivity of this species to common pesticides. The Alabama pearlshell may be more susceptible to pesticide residues than test organisms currently used in bioassays, therefore, pesticide label restrictions may be inadequate to protect them. Agricultural crops locally grown within the range of the Alabama pearlshell that are associated with high pesticide use include cotton, peanuts, and soybeans.

The confirmed extant populations of the Alabama pearlshell are in the vicinity of highway crossings. The primary habitat and highest abundance of the Hunter Creek population is immediately downstream of a heavily used U.S. Highway. Highway and bridge construction and widening could eliminate this population unless appropriate precautions are implemented to protect the species.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

The Alabama pearlshell is not a commercially valuable species nor are the small streams it inhabits subject to harvesting activities for commercial mussel species. The species has been taken for scientific and private collections in the past. Such activity may increase as the specie's rarity becomes known. Although collecting is not considered a factor in the decline of this species, the localized distribution and small size of the known extant populations renders them vulnerable to overzealous recreational or scientific collecting.

C. Disease or predation.

Diseases of freshwater mussels are poorly known. Juvenile and adult mussels are prey items for some invertebrate predators and parasites (nematodes, mites, etc.), and provide prey for a few vertebrate species (racoons, muskrats, otter, etc.). Although predation by naturally occurring predators is a normal aspect of the population dynamics of a healthy mussel population, predation may contribute to the further decline of this species due to the localized extent and low numbers of mussels associated with the extant populations.

D. The inadequacy of existing regulatory mechanisms.

Although the negative effects of point source discharges on aquatic communities in Alabama have been reduced over time by compliance with State and Federal regulations pertaining to water quality, there has been less success in dealing with nonpoint source pollution impacts to small stream drainages. Such impacts result from individual private landowner activities (e.g., construction, grazing, agriculture, silviculture, etc.), and public construction works (e.g., bridge and highway construction and maintenance, etc.). The effects of such activities can be, and often are reduced by employing Best Management Practices.

The Alabama pearlshell has been identified by the Alabama Department of Conservation and Natural Resources (ADCNR) as a "Priority 1" species of highest conservation concern due to its extremely restricted distribution (Mirarchi *et al.* 2004). This classification identifies species that are critically imperiled and at risk of extinction or extirpation, however, the designation offers no legal protection. Lacking State or Federal protection, the Alabama pearlshell is not currently given any special consideration under other environmental laws when project impacts are reviewed.

E. Other natural or manmade factors affecting its continued existence.

The threats to the Alabama pearlshell are compounded by its limited range and low numbers. The three known populations are vulnerable to random catastrophic events (e.g., flood scour, drought, toxic spills, etc.). The effects of the 2000 drought on Alabama pearlshell are currently unknown; however, the small stream habitat of the species is susceptible to dewatering from droughts. Limited range and low numbers also makes the species vulnerable to land use changes within the three occupied watersheds that would result in increases in nonpoint source pollution impacts.

The Alabama pearlshell would be adversely affected by the loss or reduction in numbers of the fish host essential to its parasitic glochidia stage. The specific fish host for larval Alabama pearlshells is not known, therefore, impacts on this aspect of the mussel's life cycle cannot be evaluated.

#### CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The Alabama pearlshell has been identified by the Alabama Department of Conservation and Natural Resources (ADCNR) as a “Priority 1” species of highest conservation concern due to its extremely restricted distribution (Mirarchi *et al.* 2004). Conservation activities have been limited to working with private landowners in south Alabama to encourage the use of Best Management Practices to reduce the effects of agriculture and silviculture, and periodic monitoring of populations. The State of Alabama is establishing a propagation facility for imperiled mussels and snails, and has worked with the Service to prepare and implement a Plan for Controlled Propagation, Augmentation, and Reintroduction for freshwater mollusks of the Mobile Basin (U.S. Fish and Wildlife Service 2003).

#### SUMMARY OF THREATS

Only 3 small populations of the species are known to exist. The small streams inhabited by Alabama pearlshell are vulnerable to local land use activities which may affect water or habitat quality. Extant populations are vulnerable to droughts and/or severe storms.

#### RECOMMENDED CONSERVATION MEASURES

Landowner notification, and implementation of protective conservation practices on private lands bordering the small creeks inhabited by the Alabama pearlshell.

## LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
<b>High</b>	<b>Imminent</b>	Monotypic genus	1
		<b>Species</b>	<b>2*</b>
	Non-imminent	Subspecies/population	3
		Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

*Magnitude:* The Alabama pearlshell is currently known from only three very localized and limited populations. All are highly vulnerable to changes in adjacent land use and resulting perturbations, as evidenced by the severe decline of the species. Due to the nature of small stream habitats, and the localized distribution of the species, all known surviving populations are vulnerable to extirpation from natural or human impacts.

*Imminence:* Threats are imminent. Land use activities currently conducted in these drainages include cattle grazing, row cropping, silviculture, and construction. Droughts in the past decade have affected these small stream habitats. Heavy rains from recent hurricanes may also adversely affect small stream habitats and the mussel populations they support.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. We have evaluated the current immediacy and magnitude of identified threats to the species in the threats analysis section of this form. At this time, we do not believe the species warrants the need for emergency listing as outlined in Section 4 of the Endangered Species Act. However, we will continue to monitor and assess the status and trends of the species and could adjust this conclusion based on the best scientific and commercial information available.

**DESCRIPTION OF MONITORING:** Since the 2004 update of this assessment form, species experts and appropriate individuals with State and Federal agencies have been



contacted and asked to provide any new data on the Alabama pearlshell. These include Doug Shelton, AL Malacological Research Center; Stan Cook, ADCNR; Jeff Powell, USFWS. The species has been monitored periodically by Doug Shelton, a private malacologist who resides in Mobile, Alabama. Mr. Shelton has been following the status of the species for several years and is familiar with the species and its habitat. He has made contact with many of the riparian landowners, and informed them of the presence of the species on their properties. Extant populations were confirmed in 2005 by Mr. Shelton and Jeff Powell, FWS, Daphne, MS.

## COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Alabama provided editorial comments on this latest Species Assessment.

## LITERATURE CITED:

### Peer-reviewed original research based on data:

- Box, J.B. and J. Mossa. 1999. Sediment, land use, and freshwater mussels: prospects and problems. J. N. Am. Benthol. Soc. 18(1):99-117.
- Clench, W.J. and R.D. Turner. 1956. Fresh-water mollusks of Alabama, Georgia, and Florida from the Escambia to the Suwannee River. Bulletin of the Florida State Museum 1:97-239.
- Conrad, T.A. 1838. Monography of the family Unionidae, or naiades of Lamarck, (Fresh water bivalve shells) of North America. Philadelphia, Pennsylvania, pp. 93-94, plate 51.
- Dennis, S.D. 1984. Distributional analysis of the freshwater mussels of the Tennessee River system, with special reference to possible limiting effects of siltation. Ph.D. Dissertation, VPI & SU, Blacksburg, Virginia, 171 pp.
- Ellis, M.M. 1936. Erosion silt as a factor in aquatic environments. Ecology 17:29-42.
- Johnson, R.I. 1983. Margaritifera marrianae, a new species of Unionacea (Bivalvia:Margaritiferidae) from the Mobile-Alabama-Coosa and Escambia River systems, Alabama. Occ. Papers on Mollusks, Harvard Univ., Cambridge, Massachusetts.
- Negus, C.L. 1966. A quantitative study of growth and production of unionid mussels in the River Thames at Reading. J. Animal Ecol. 35:513-532.
- Ortmann, A.E. 1912. Notes upon the families and genera of the naiades. Annals of the Carnegie Museum 8(2):222-365.

Simpson, C.T. 1914. A descriptive catalogue of the naiades or pearly freshwater mussels. Detroit, Michigan, Parts 1-3, pp. 523-524.

Peer reviewed secondary research derived:

Mirarchi, R.E., J.T. Garner, M.F. Mettee, P.E. O'Neil, eds. 2004. Alabama wildlife. Volume 2. Imperiled aquatic mollusks and fishes. The University of Alabama Press, Tuscaloosa, AL. 255 pp.

Stansbery, D.H. 1976. Naiad mollusks. In: H. Boschung (ed.). Endangered and threatened plants and animals of Alabama. Alabama Museum of Natural History Bulletin (2):44.

Grey research based on data:

McGregor, S.W., T.E. Shepard, T.D. Richardson, and J.F. Fitzpatrick, Jr. 1996. A survey of the primary tributaries of the Alabama and lower Tombigbee Rivers for listed and candidate species of freshwater mussels, snails and crayfish, 1994-1996. Geological Survey of Alabama, Tuscaloosa, AL. 34 pp.

Shelton, D.N. 1995. A status survey for the Alabama Pearl Shell, Margaritifera marrianae R.I. Johnson, 1983. Barry A. Vittor and Associates, Inc., Mobile, AL. 11 pp.

Shelton, D.N. 1996. The distribution, abundance, and life history of the Alabama pearlshell, Margaritifera marrianae R.I. Johnson, 1983. Alabama Malacological Research Center. Mobile, AL. 12 pp.

Grey literature based on literature analysis:

U.S. Fish and Wildlife Service. 2003. Freshwater mussels and snails of the Mobile River Basin: plan for controlled propagation, augmentation, and reintroduction. Ecological Services. Jackson, MS. 17 pp.

Other:

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 11/16/2005  
Acting Regional Director, Fish and Wildlife Service Date



Concur: \_\_\_\_\_ August 23, 2006  
Acting Director, Fish and Wildlife Service Date

Do Not Concur: \_\_\_\_\_  
Director, Fish and Wildlife Service Date

Date of annual review: October 2005

Conducted by: Jackson, Mississippi Field Office